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ABSTRACT

The intent of this paper is to examine the current educational literature relevant to interdisciplinary instruction. Its focus is to provide educators with information to facilitate planning for effective interdisciplinary instruction, particularly at the secondary level. Current research literature indicates that using an interdisciplinary, or integrated, curriculum provides opportunities for more relevant, less fragmented, and more stimulating experiences for students. Various models and approaches towards this form of instruction are presented and the emergent patterns discussed. The research shows little qualitative and quantitative data on the effectiveness of interdisciplinary instruction and on how to plan for this form of instruction; much of the literature found relates to specific case studies of particular schools. The literature reveals five primary elements related to planning for interdisciplinary instruction: (1) the need for administration support, vision, and resources, as well as teacher commitment; (2) the identification of teams of teachers and students and the interdisciplinary model to be implemented; (3) an identification of the unit theme, including objectives, activities, and evaluation methods; (4) planning time made available for teachers as well as inservice training; and (5) the selection of a theme that centers around self and society. Interdisciplinary planning model samples are included in the appendix. (Contains 33 references.) (ND)

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Planning for Interdisciplinary Instruction: A Literature Review

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Planning for Interdisciplinary Instruction: A Literature Review

Abstract-The intent of this paper is to examine the current educational literature relevant to interdisciplinary instruction toward providing a comprehensive view of interdisciplinary (multidisciplinary) instruction and the development of generic methodology. The focus is to provide educators with information to facilitate planning for effective interdisciplinary instruction, particularly at a secondary level.

Statement of Purpose

The purpose of this paper is to help answer the following question: What is the most effective way for teachers to plan for interdisciplinary (multidisciplinary) instruction? After reviewing the literature research base, the importance and need for interdisciplinary instruction in classrooms will be discussed. In addition, suggestions for effective planning will be given.

Background and Need

Interdisciplinary teaching is an integrative approach to the subject area disciplines at any level of education. Interdisciplinary teaching is based on the premise that human beings learn best when the material they are learning overlaps into various disciplines. The *Dictionary of Education* (Good, 1973) defines integrated curriculum as: "a curriculum organization which cuts across subject-matter lines to focus upon comprehensive life problems or broad areas of study that bring together the various segments of curriculum into meaningful association." Current research indicates that using an interdisciplinary, or integrated, curriculum provides opportunities for more relevant, less fragmented, and more stimulating experiences for students (Jacobs, 1989). The philosophy of interdisciplinary teaching consists of three principles related to: (1) the way students best acquire knowledge; (2) the important role of not only reaching students during their developmental stage but influencing the teaching of subjects; and (3) the cooperative involvement of both students and teachers in planning and learning together to modify the instruction of the end product-the students (Jacobs, 1989; Antonellis & James, 1973).

Interestingly enough, Columbia University Press, in 1937 published a book

by Edison Oberholtzer entitled, *An Integrated Curriculum in Practice*. It is fascinating that over fifty years ago the idea of integrating the curriculum was being considered. In his book, Oberholtzer describes integrating the curriculum in the Educational Program of the Public Elementary Schools of Houston, Texas (Oberholtzer, 1937). Now, even more educators are coming to realize one of the fundamental problems in schools today is the "separate subject" approach to knowledge and skills. Often, when one is confronted with a problem, one does not look back and think what subject area knowledge one needs in order to solve a problem. In general, the search for an improved approach to organizing the curriculum is greatly influenced by a desire to make better connections. The separate subject curriculum can be viewed as a jigsaw puzzle without any picture to help put the pieces together. Many times students ask, "Why do we need to learn this?" They see no value or connection in what they are learning; therefore, they create a puzzle that has no real meaning other than the picture made. According to Beane (1992), bits and pieces of different content knowledge areas and skills can come together in a more coherent picture. Students are likely to give more meaning to what and why they are learning; the interdisciplinary model contributes to this learning approach (Beane, 1992; Asghar, McKeachie, & Berliner, 1990). What the educational literature indicates concerning effective

teacher planning for interdisciplinary instruction will be the main focus of this paper.

Problem Defined and Initial Questions

Terms Defined

Interdisciplinary (multidisciplinary) instruction defined in the *Dictionary of Education* (Good, 1973), is: "a curriculum organization which cuts across subject-matter lines to focus upon comprehensive life problems or broad areas of study that bring together the various segments of curriculum into meaningful association." Beane (1995) defines curriculum integration as a way of thinking about the purpose of schools, the sources of curriculum, and the basis of knowledge. Beane believes in order to define curriculum integration, there must be a reference to knowledge. Curriculum should involve a student search for both self and social meaning.

Planning is defined by Shafritz (1988) in *The Facts on File Dictionary of Education* as the formal process of making decisions for the future of individuals and organizations. This form of planning may fit into two categories of planning: strategic and operational. Strategic planning is long-range, comprehensive,

integrated, and managerial. Operational planning is concerned with the implementation of the larger goals determined by strategic planning. For the purpose of this paper both forms of planning will be considered.

According to Jacobs and the Association for Supervision and Curriculum Development (1989), interdisciplinary instruction denotes a particular framework. Frequently interdisciplinary planning and teaching involve some assumptions about "ideal circumstances." The main assumptions are:

1. Two or more teachers are involved.
2. All teachers share common planning time.
3. All teachers share the same students.
4. All teachers are skilled in professional collaboration, consensus building, and curriculum development.
5. Students know how to behave and work in an interdisciplinary environment.

According to Robinson (1994), a few considerations are necessary in preparing for interdisciplinary instruction:

1. Types of interdisciplinary planning and instruction include:

    A. Single Subject Field / Single Teacher

B. Single Subject Field / Multiple Teachers

C. Multiple Subject Fields / Single Teacher

D. Multiple Subject Fields / Multiple Teachers

2. Types (or methods of interdisciplinary subject matter correlation):

A. Unified Subject Field

B. Theme

C. Topic

D. Problem

3. Interdisciplinary planning and instruction should focus on getting students to use learning skills, such as the following:

A. Reading

B. Research Techniques

C. Collaboration Skills

D. Problem Solving Skills

E. Mathematical Application

F. Data Collection and Analysis

G. Drawing Conclusions and Arriving at Consensus

H. Writing and Reporting Skills

4. In preparing for interdisciplinary instruction, the following goals may be kept in mind:

   A. The lesson or unit should complement or support some aspect of instruction in the subject area.

   B. The lesson or unit should complement or support the content and/or learning skills in at least one other subject field.

   C. The lesson or unit should be constructed in a manner which encourage students to integrate and use the new knowledge and skills from several areas of competence.

Initial Questions

The primary question addressed in this paper is: What does current research indicate concerning effective plans for interdisciplinary instruction? This question generates others which fit into the categories of why, who, where, what, how, and when. Who benefits from this form of instruction? Who plans for this form of instruction? Where do we use it? What do we teach? and When should this form

of instruction be used? Answers to these questions are presented in the literature review. The focus is on the instructional planning for this form of instruction.

Most of the beliefs about interdisciplinary instruction form the basis for the implementation of interdisciplinary teaching. Teachers often base their own practice on prior beliefs and knowledge. It is important that teachers strive to improve their practice of teaching through peer interaction, professional reading, and involvement in education organizations. With public attention on school reform, school leaders are looking for different approaches to improve curriculum and instruction in order to better prepare students for the rapidly changing world. With teacher collaboration, support from school administration, the community, outside consultants and educational research, schools can now look at the interdisciplinary model of teaching as one approach to enhancing their schools, students, and the community. It is now important to review and critique the information supporting the research on effectively planning for interdisciplinary instruction.

Review of the Literature on Planning for Interdisciplinary Instruction

As previously discussed above, the educational community is pushing to

integrate curriculum in America's schools. The emphasis is on making the curriculum provide more meaningful learning connections for today's youth. Teachers, however, accustomed to a more traditional, discipline-based curriculum, find it difficult to plan for a more integrative approach toward teaching involving teacher collaboration, curriculum revamping, and teacher support from both state and school administrators. Therefore, this section of the paper examines research on planning for interdisciplinary instruction. To effectively plan for this form of instruction, the research literature specific to interdisciplinary instructional planning is considered.

How do educators plan for interdisciplinary instruction?

Before one can propose a comprehensive generic methodology for interdisciplinary planning, one must first identify the ideal contributors toward the formulation of such a plan. The research studies related to the who's of how to plan for multidisciplinary instruction indicates the involvement of both students and educators as part of the planning process. The methodology presented in this paper will include a focus of planning which involves both students and educators.

Students

Huhtala, in a 1994 study of Beaverton High School in Oregon found that interdisciplinary instruction is more effective when heterogeneous grouping, or more simply, mixed ability grouping is used. The lack of heterogeneity in this case meant that students often lacked role models for behavior, goals for academic achievement, and leadership. Interestingly enough, the faculty, after reflecting on past experiences, found it was important to continue using group investigations, an organizational approach which allows a class to work actively and cooperatively in small groups, and enables students to take an active role in determining their own learning goals and the processes. This study was used as an organizational principle in relation to problem-based situation. The key finding was the congruence between the social organization of the classroom and the governance of the school. Consequently, an interdisciplinary program must be both supported and incorporated at all levels by both teachers and administrators.

Oxley (1993) discusses the idea of organizing schools into smaller units. A small unit can be looked at as a team of students and teachers grouped as a small unit where the teachers and even students plan particular learning activities for the group of learners. Oxley's work with schools in Philadelphia and Germany using

small-unit organization has proven to be extremely effective. Proponents of small-unit organization argue that it eliminates alienation, supports a more coordinated and concentrated instructional appraoch, and offers teachers more input into the decision-making process. Oxley believes that small-unit organization lends itself to a more appropriate method for organizing interdisciplinary instruction.

Dalton (1980) found in his work with interdisciplinary activities at the Amboy School in Illinois that there are many multidisciplinary activities in which the students participate including writing essays, writing newspaper articles, and designing buildings. In this study, Dalton found that student projects can be a large part of what makes up interdisciplinary instruction.

Williams and Reynold (1993) in their extensive work with interdisciplinary instruction in the North Carolina Schools found that, while it is important for each of the subject-area experts to make sure activities are included from each discipline, learners, too, can influence decisions about the themes and activities. Students may brainstorm ideas and discuss them prior to the teaching team's decisions to implement a unit.

One successful interdisciplinary program cited by the Carnegie Council on Adolescent Development (1989) demonstrates the importance of teaming both at the student and teacher levels. Teaming is usually defined as grouping a unit of students who all share the same students. Teachers plan together units of study that they teach to their students together. Teaming is common in interdisciplinary instruction. One school, Timilty High School, found that across the city, standardized test scores increased following the implementation of teaming and interdisciplinary instruction. Teaming has been shown to create conditions which are directly related to student social bonding (Arhar, 1992).

Educators

Palmer (1991), an advocate of "planning wheels," has done extensive work with the Howard County Public Schools in Maryland related to interdisciplinary instruction. A planning wheel is a visual and written map of the interdisciplinary unit serving as a graphic organizer (See the sample in Appendix A). It usually contains many circles that branch out containing activities to be included in all disciplines for a particular theme to be studied. Here teachers, working with curriculum supervisors, meet in cross-disciplinary groups to identify common goals, objectives, themes, and skills. Planners develop sample planning wheels or

webs/maps to illustrate the kinds of connections that can be made (See Appendix A for samples). This is done for each grade level. Inservice leaders can help teachers to implement the new curriculums with a cross-disciplinary approach. Palmer found the following as favorable practices: (1) creating cross-curriculum objectives within a given curriculum guide; (2) developing model lessons that include cross-curricular assessment and activities; (3) designing enrichment or enhancement activities within a cross-curriculum focus; (4) utilizing assessment activities that are cross-curricular in nature; and (5) incorporating sample planning wheels in all curriculum guides. The results have been promising and positive (Palmer, 1991).

Fogarty (1991) advocates ten models which give faculties a solid foundation for designing curricula to help students make valuable connections while learning. Fogarty offers fragmented, connected, and nested models for teachers within single disciplines. Sequenced, shared, webbed, threaded, and integrated models may be used to integrate across several disciplines. The other two models; immersed and networked, relate to learners themselves. These models will not be discussed individually, instead mention is given to provide the reader with an array of designs (See Appendix A for samples of the models).

Mecca (1991) found, in a study of inservice training for elementary teachers and middle school mathematics and science teachers (n=90) held in Upstate New York on integrating mathematics and science that most teachers were extremely receptive to the idea of curriculum integration according to the results from the surveys that were given after the inservice training session. In addition, their interest in pursuing the topic of interdisciplinary instruction further was stimulated.

Meichtry (1990) found in a research investigation on a middle school interdisciplinary team how this form of teaming influenced teacher interaction and classroom practice. These teachers were observed in their classrooms at various times throughout the day. The findings revealed that classroom practices such as curriculum planning, delivery of instruction, evaluation of student performance, and behavior management were influenced by the multidisciplinary nature of teacher interactions with students. These findings were congruent with the theory base for the study that teachers' attitudes, cognition, and beliefs are socially constructed and maintained through daily organizational life (Meichtry, 1990).

Teaming is a important part of multidisciplinary instruction. Erb and Doda (1989) believe there are some characteristics for effective teaming. The characteristics of an effective team should include things like: a balanced heterogenous team, appropriate subject matters, close in proximity, common planning times for teachers, a team leader, regular meetings, shared decision-making, and accountability.

A great deal of literature suggests themes being taught during an interdisciplinary unit should be directly related to society and self (Beane, 1995; and Williams and Reynolds, 1993). Teachers at the Carolina Day School in Ashville found they have been most successful when teachers build interdisciplinary thematic units around hot local issues which bring the community into the classroom. Williams and Reynolds (1993) reported in their school that the success of an interdisciplinary unit depends on a good choice of themes. Williams and Reynolds maintain one giant hurdle the interdisciplinary team must clear is the temptation to force integration of the curriculum by stringing existing activities together. Hence, teachers need to let go of old comfortable props and be willing to focus on fresh new themes.

Jacobs' extensive fieldwork in planning for curriculum integration lead her to write many articles on the subject. Jacobs (1991) presents a four-phase action plan for school districts to effectively create multidisciplinary units and see them to successful adoption. Jacobs feels schools need action plans. This ties in with the first phase of her plan requiring staff members to conduct action research for the first six months to a year. The teachers, perhaps in teams should read the research and attend conferences on curriculum integration, trying to apply some of their findings into classroom practice. Teachers in this phase decide whether this form of instruction is right for them and their school. In phase two of Jacob's plan, teachers develop a proposal. They choose interdisciplinary units and time frames during which they will be taught. Phase three is the actual implementation of the unit; there the unit is considered a pilot to be monitored involving some form of data collection. Once the team of teachers feels the pilot is effective they can adopt the model and make revisions if necessary. Jacobs (1991) believes the entire curriculum integration process can be accomplished over a three-year period.

Brophy (1991) reports curriculum integration is not always a good idea. Brophy maintains before students engage in activities designed to promote curriculum integration, the following criteria should be applied to activities: (1)

educationally significant, desirable even if they do not include the integration feature, and (2) activities foster, rather than disrupt or nullify, accomplishment of major goals in each subject area. Brophy contends that the activities within schools must accomplish important educational goals.

Jacobs (1989) contends that the first step in the interdisciplinary unit design is selecting a problem or concept, followed by a concept outline, a content outline, and instructional objectives that match state syllabi. Jacobs believes in interdisciplinary planning it is important to avoid the potpourri effect, which means that often many units become a sampling of knowledge from each discipline (See Appendix A for samples). Jacobs insists that unlike the disciplines which have an inherent scope and sequence used by curriculum planners, there is no general structure in interdisciplinary work (Jacobs, 1989).

Glatthorn (1994) contends a quality curriculum incorporates the disciplines in an integrated manner. Glatthorn contends that there are essentially three choices to define the extent of integration: (1) develop integrated units within existing curriculum and schedule themes centered around change and community issues; (2) develop an integrated course perhaps social studies and English at the middle

school level; and (3) restructure the curriculum around an integrated program. Hence, there are many models a school and its teachers may use when considering integrated curriculum.

Brainstorming seems to be the main process that is used in the planning of interdisciplinary instruction. Brainstorming is defined as an activity in which a group of people generate possible solutions or ways to do something and then select the best for the situation at hand. In the Aleknagik School in Alaska, all teachers are involved in brainstorming prior to planning 8 to 10 week units as well as daily and weekly activities (Peters, Schebeck, & Hopkins, 1995).

Beane (1992) asserts that teachers must dissolve subject lines and realize that the point behind the integrated approach is the blurring or termination of subject lines. Beane also contends it is unlikely the integrated approach will result from inservice training or staff development courses. Instead, the process begins with those teachers who are interested in working toward this approach, in every school there are at least a few teachers interested.

The Alaska State Department of Education in Juneau, Alaska in 1991

published a teacher's guide showing teachers how to integrate the curriculum. The philosophy is that the interdisciplinary approach applies methods and language from more than one discipline to examine a central theme, issue, problem, topic, or experience. It is utilized in order to enhance the ability for students to acquire the knowledge, skills, and attitudes of various disciplines. The guide is organized in a series of seven steps: (1) problem selection and concept outline; (2) content outline; (3) thinking processes; (4) planning prototype; (5) instructional objectives; (6) learning activities; and (7) evaluation procedures (see Appendix A for some samples).

The North Carolina State Department of Public Education (1987) in an integrated state curriculum emphasized the use of the community as a resource and a plan of study by introducing the concept of webbing, an open-ended planning process designed to emphasize relationships between ideas and subjects. The units as suggested by the North Carolina State Department of Public Education should contain: (1) a goals and objectives web; (2) an activities web; (3) suggested integrated activities; and (4) selected resource materials. Thus, the emphasis was on webbing being used in the planning process.

Panaritis (1995) in his work with the Bronx City High Schools found that a better place for an interdisciplinary pilot project is within the planning of a single two- or three-day curriculum unit around a tightly focused essential question or clear cut theme. Working with just a few teachers across different disciplines has proved to be a more effective approach when getting started (Panaritis, 1995).

The Aleknagik School in southwest Alaska, revolves their curriculum around a theme that has a science or a social studies emphasis. The outcomes according to three teachers involved in the program, have been encouraging (Peters, Schebeck, & Hopkins, 1995). The students in the entire school study a theme for about 8 to 10 weeks. The themes focus on local issues in the school and community. During the last period of the day the school has "thematic time" during which students in all grades K-8 work together in cooperative groups. Thus, all students practice interdisciplinary instruction throughout the day schoolwide (Peters, Schubeck, & Hopkins, 1995). Teachers spend a great deal of time collaboratively planning and sharing teaching philosophies. The Aleknagik School has found that interdisciplinary instruction can be utilized in grades kindergarten through grades 8 and can be used on a regular basis throughout the school year.

Polto and Rhen (1988) found, in their study of full-scale curriculum integration project in Pennsylvania's Dauphin County Technical School, that teachers need time on a daily, weekly and monthly basis to meet in teams to discuss and plan for integrating academic and vocational education. In this particular school the emphasis is on showing students how specific academic skills apply to specific tasks; teachers strive to help students realize academic skills are transferable to many occupational areas. This school over a four year period has seen some favorable results, with a rise in student mathematics scores and stabalized reading scores.

Teachers at the Manhattan's Central Park East Secondary School in New York are allotted time to plan and evaluate their interdisciplinary units once or twice a week. While students are working in the community or attending other classes, the interdisciplinary teams meet for two- or three-hours to plan (Panaritis, 1995). Reducing the teaching load of members of the pilot team by one class during the school day is one of the most effective ways for promoting interdisciplinary instruction says Panaritis (1995), the instructional congruence specialist for Bronx High School.

School communities are where multidisciplinary instruction should be emphasized according to Williams and Reynolds (1993). Community resources are close and ignite students' interest in the topic at hand. Local issues present many ways to bring the community into the classroom. Such opportunities include guest speakers, exhibits, and ways to display student research.

Methodology of Analysis

The approach to examining the research on effective planning for interdisciplinary instruction will follow. Various models and approaches towards this form of instruction are presented and the emergent patterns discussed. It is important to note there is little qualitative and quantitative data on the effectiveness of interdisciplinary instruction and how to plan for this form of instruction. A great deal of the literature found relates to specific case studies of particular schools. The studies show what works most effectively for each of the particular sites; hence, the existing models are examined.

Interpretation of the Data-Emergent Patterns

In interpreting the data through a literature review there are several emergent themes reoccurring throughout. The following five themes prevail are most

supportive to this form of instruction. These five themes then may help schools and teachers plan more effectively for interdisciplinary instruction. The following themes include:

I. Support and Resources from Administrators along with Teacher Commitment.
(A Schools' Philosophy-Dissolving the Disciplines)

II. Identification of Target Group-Teachers and Students-Model Used
(Teaming-Block Planning and heterogeneity of the group)

III. Identification of Unit-Brainstorming Big Ideas (Theme)
(Develop Objectives, Activities, Length, and Evaluation)

IV. Planning Time made Available in School for Teachers
(In-school planning time for teachers, inservice training, and relief)

V. Themes related to Self and Society
(Social-Authentic-Life Centered Theme Approach)

In examining the five emergent themes, it is important to note that two different forms of planning exist: strategic and operational. By having administrative support, teacher commitment, school vision, identification of teaming, the interdisciplinary model, and providing teachers with planning time and inservice all correspond with strategic planning which is necessary for interdisciplinary instruction to get off the ground and to materialize. The

identification of goals, activities, length of the unit, evaluation methods, and themes chosen all relate more to the operational planning that needs to take place for this form of instruction to be effective. The five themes that emerged from the study provide implications that need to be considered.

Implications

The findings from this literature review on planning for interdisciplinary instruction have implications for practicing teachers and community leaders. Recognizing that change occurs through the empowerment of all, school administrators must realize the need for a more wholistic approach to teaching America's children. School administrators must be willing to find the resources, support, and develop a philosophy in their schools of this interconnected form of instruction. Teachers too must have a commitment to this form of instruction to make the change possible. School districts willing to provide inservice training and planning time within the school day for teachers have proven to be successful in the implementation of interdisciplinary instruction. Interdisciplinary instruction means breaking down and dissolving the disciplines into interrelated areas of study. Teachers willing to work together with students in collaborative groups can develop meaningful objectives that overlap all subject areas. It is important that

the collaborative groups be interrelated and show continuity in the interdisciplinary units they construct. Students see connections from one discipline to the other, not just isolated activities in each subject area related to a theme. Schools and educators realize that for this form of instruction to take place, time must be allotted for teachers during the school day to meet and plan. Administrators realize that if an interdisciplinary approach is going to be a success then teachers must have time in school to work together.

Teaming is another critical issue. Teachers decide whether they will share students in the interdisciplinary approach or whether they will bring all of their classes together as one. The model is important in how the teachers plan for interdisciplinary instruction. It is also recommended that teachers include students from varying ability groups when they practice this approach. These findings show how critical it is to develop units that are authentic and society based. The themes chosen must lend themselves to helping the students make better connections to all disciplines and the world around them. Planning for interdisciplinary instruction is not an easy task. Panaritis (1995) says that planning for a successful interdisciplinary program is demanding and should never be taken for granted. He feels that it is still the most powerful and appropriate way to

reconstruct our classrooms. Interdisciplinary planning requires: time, resources, incentives, committed teachers, flexibility, and patience.

Research suggests the use of an interdisciplinary program is likely to aid in the mastery of subjects. The National Council of Teachers of Mathematics (NCTM, 1989) advocates in their standards a multidisciplinary approach to teaching mathematics. Many other national associations are following in this direction in their standards for their represented disciplines. Students will become better problem solvers and be able to "transfer" problems better (Beane, 1989). Beyond higher-order thinking skills and a deeper content mastery, improvements in broader and subtler characteristics of the learners can be expected. If the integrated program has done its job, students will be equipped, and indeed inclined, to solve any problem in a broader perspective (Jacobs, 1989). Interdisciplinary teaching also fosters collegiality among the staff (Williams and Reynolds, 1993). The idea of change in education through teacher and student empowerment (Good & Brophy, 1994; Cuban, 1993) provides an optimistic outlook when the interdisciplinary approach is employed in America's schools. The integrative approach is believed to be fruitful for society, students, and teachers (Mayville, 1978)

Conclusion

In summary, some of the research collected here depicts the most effective ways in which interdisciplinary instruction can be approached. The literature findings include five important elements in relationship to planning for interdisciplinary instruction: (1) the need for both administration support, vision, and resources, as well as, teacher commitment; (2) the identification of teams of teachers and students and the interdisciplinary model to be implemented; (3) an identification of the unit theme, including: objectives, activities, and evaluation methods; (4) planning time made available for teachers as well as inservice training; and (5) the selection of a themes that centers around self and society-real world authentic issues. The integrative curriculum then, must be built teacher by teacher, classroom by classroom. It is necessary to have support from both administrators and the community. Another facet of these concepts is that everyone must stop thinking about interdisciplinary instruction as "experimental." It is important to point out that further research on the effectiveness of interdisciplinary instruction is needed as well as research on planning for this form of instruction. Research has shown now for years that connections are made and learning is more meaningful when the curriculum is presented in an integrated

manner across the disciplines. With its promise of unifying knowledge and modes of understanding, interdisciplinary education represents the pinnacle of curriculum development.

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Appendix A

Interdisciplinary Planning
Model Samples -

Appendix A

Interdisciplinary Planning
Model Samples

Options for Content Design

Discipline-Based:

Separate subjects are taught in separate time blocks.
Integration is avoided.

Parallel Discipline Designs:

Teachers sequence their lessons to correspond to lessons in the same area in other disciplines.
The content does not change: only the order in which it appears changes.
No formal connection between disciplines.

Complementary Discipline Units:

Certain related disciplines are brought together in a formal unit to investigate a theme or issue.

Interdisciplinary Units:

Periodic units or courses of study deliberately bring together the full range of disciplines in the school's curriculum.
The units are of specific duration: a few days, a few weeks, or a semester.
The option does not purport to replace the discipline-field approach; rather, they are mutually supportive.

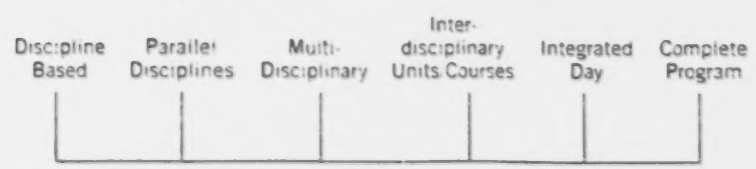
Integrated Day Model:

A full-day program based primarily on themes and problems emerging from the child's world.
Focuses on child's questions and interests rather than on content determined by a school or state syllabus.

Complete Program:

Students live in the school environment and create the curriculum out of their day-to-day lives.

Continuum of Options for Content Design



Design Options

(Jacobs, 1989)

CHARACTERISTICS OF EFFECTIVE TEAMING

TEAM ORGANIZATION

1. Teams should be balanced and include team members who have varied teaching and learning styles. Learning style inventories can be used to identify modalities, right/left brain tendencies, and preferred instructional modes.

2. Teams should include team members with the appropriate subject matter competencies. A four member team should include the specialties of math, science, social studies, and language arts/English/reading. A three member team should include any three of these areas with a strong back-up in the fourth area. A two member team should include experience/training/degrees in a science/math combination and a language arts/social studies combination.

3. Teams should be assigned or housed in specific team areas with adjacent classrooms. School floor plans can be adapted to the teaming process by designating sections of the building for grade/team assignments or reassigning space to accommodate those teachers working together.

4. Teams should have a common planning space so that team members can meet daily for team meetings, can house shared materials for mutual accessibility, can hold student or parent conferences in close proximity to one another, and can store records or files.

(Erb & Doda, 1989)

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CHARACTERISTICS OF EFFECTIVE TEAMING

TEAM ORGANIZATION

5. Teams should have a common planning time to facilitate daily meetings which are needed to:
   a. determine schedule
   b. discuss students
   c. develop interdisciplinary lessons/units
   d. plan goals and objectives
   e. design special team events/activities and
   f. evaluate programs.

6. Teams should designate a team leader and key roles/responsibilities for both team leader and team members.

7. Teams should hold regular team meetings with predetermined agendas and concise minutes.

8. Teams should strive to preserve team autonomy and flexibility in planning, implementing, and evaluating instructional practices for themselves and their students.

9. Teams should share decision-making tasks with the building administration whenever and wherever possible to do so. This requires both a mutual commitment and respect among all parties involved.

10. Teams should be accountable for their own budget and supplies.

(Erb & Doda, 1989)

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Concept Outline

Title Touch and Goes

Question: What is aviation all about?

Areas of Study

- Principles of flight
- Parts of a plane
- Meteorology
- Careers
- Types of aircraft
- History of aviation
- Aerospace
- Model airplane and rocket building

Methods

- Airport visitation
- Lectures covering the material
- Presenters
- Computer flight simulator
- Model building and flying
- Readings and discussion

End Products

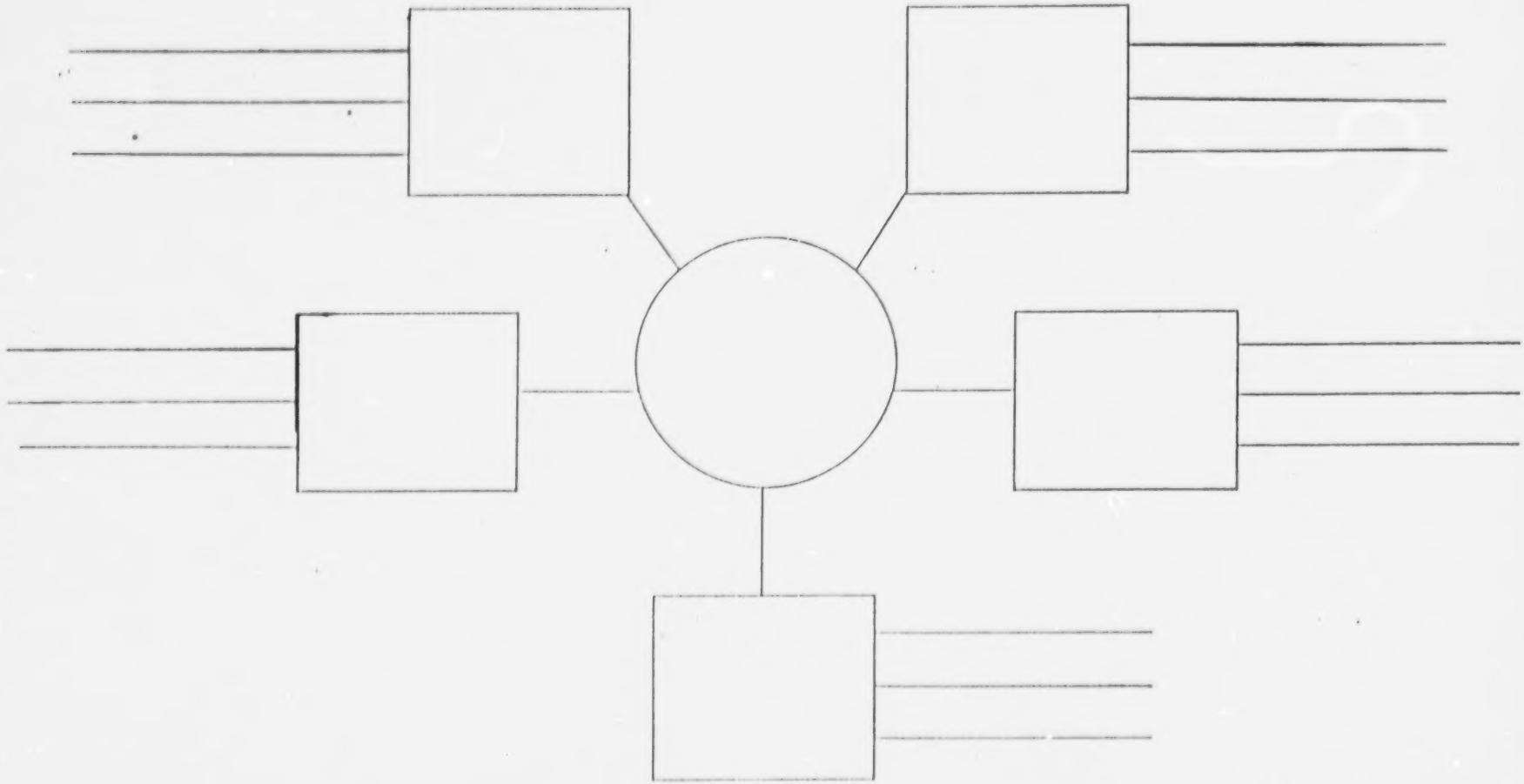
- Final oral presentation (using a model, written report or demonstration).
- Models
- Instrument panel construction
- Daily log
- Briefing book
- Slides of projects

(Alaska State Dept. of Ed., 1991)

GRAPHIC ORGANIZER

Idea Web

Sample



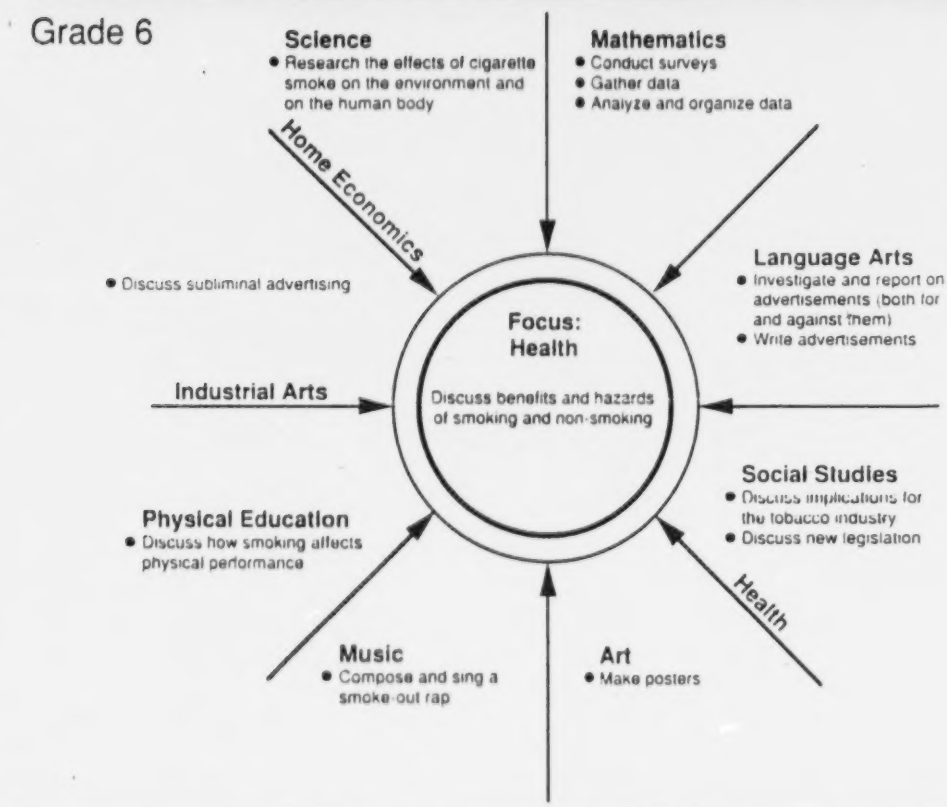
EXAMPLE OF CALENDAR CURRICULUM MAPPING

Grade 6

	February	March	April	May	June
English/ Language Arts	*Sarah, Plain and Tall*	Wilson's Letter and Diaries of Immigrants		*Diary of Anne Frank*	
Social Studies	The Westward Movement	The Industrial Revolution; World War I		World War II	
Mathematics	Fractions Roman Numerals	Metrics Compare Bases		Percents Geometric Shapes	Scale Area
Science	Matter and Energy	Electricity ◄——— Weather		Magnetism ———►	
Art	Color Western Landscapes	Shape: Cubists Picasso, Gris		Photography: Documentary Purposes	

(Jacobs, 1991)

SAMPLE PLANNING WHEEL 9: SMOKE FREE 2000



(Palmer, 1991)

Interdisciplinary Unit Planning Form

Name of the Interdisciplinary Unit:_____

Goals of the Unit:

Overall Unit Description:
(Should include a general description of the unit; a list of the activities for both combined classes and individual classes; teaching/learning methods to be employed during the unit; materials, equipment, and supplies needed for the unit; and a proposed time frame indicating the duration of the unit)

General Description:

-Continued on the next page-

Activities:

Methods:

Materials, Equipment, and supplies:

Time Frame of Unit:

Evaluation and Culminating Activities of the Unit:

Instructional Objectives & Activities Worksheet

Using the code developed in the Planning Prototype place the code in the Code column and then write an instructional objective. Once this is accomplished provide a description of the activity you plan to use to teach the objective. Remember that it is instructionally prudent to include activities that emphasize different learning modalities.

Code	Instructional Objectives	Planned Activity	Group Size
5G / PE	After game *Shrinking Habitat*, students will describe effects of human development of land on animals and plants.	Play variation of *Shrinking Habitat* on page 182 of Project Wild.	ALL
6R / Art	Given selected readings, students will recall the passage and illustrate to the best of their ability.	Read a selected section from literature. Allow students to illustrate it.	1
6C / Lang Arts	Given the two versions, students will compare and contrast in writing the 2 stories.	Read aloud to class *Lon Po Po* and *Little Red Riding Hood*. Write comparisons.	ALL
6I / Lang Arts	Given books and alloted time, students will have opportunity to read about wolves in fiction.	Uninterrupted silent reading of literature groups.	ALL
6E / Lang Arts	Given time to read, students will express opinions by responding to a daily question in their response journals and participate in literary discussion.	Literature group. Discuss on and response journals.	3-5

(Alaska State Dept. of Ed., 1991)

Assessment Planning Chart*

Grade Level 4-6 Subject _____ Topic Wolves

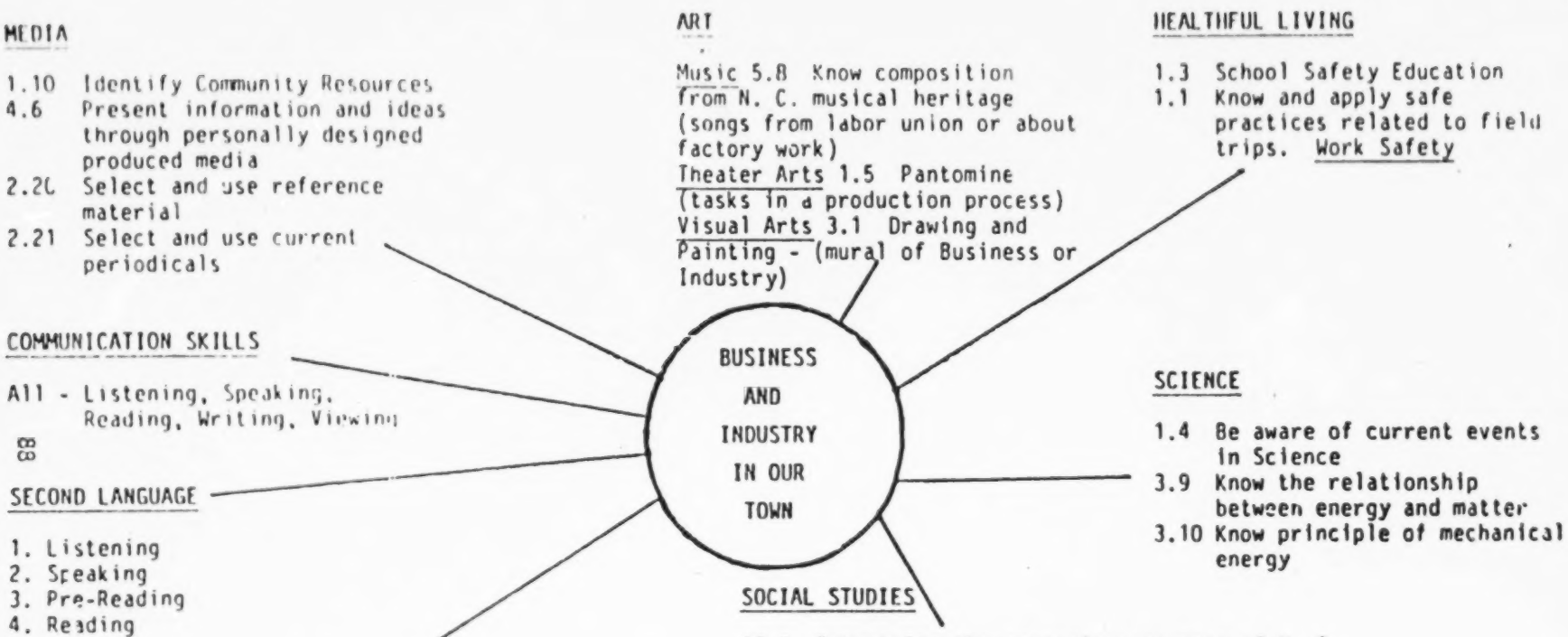
Goals	Oral	Test	Performance
1 1A/ sc			Students will label and list the physical characteristics of the wolf.
2 1C/ Art			Students will compare/contrast their sculpture to pictures and each others.
3 2A/ 3A/ 4A/ LA	Students will give oral reports with their cooperative groups.		
4 2A/ 3A/ 4A/ LA			Each group will provide 1 cooperatively written report.
5 3C/ PE		Define the words predator and prey.	
6 4E/ S/Sc	Students will assess and evaluate the use of game management and trapping on the wolf population.		
7 5A/ S/Art		Draw a picture including all elements of habitat for a wolf.	
8 5C/ S		List 3 animals or plants that once lived in the area.	
9 6A/ Art/LA	Students are to define their drawings in relation to the reading selection.		
10 ___			

*This chart is adopted from the Northwest Regional Educational Laboratory's Classroom Assessment Training Program, Richard J. Stiggins, February 1990.

Appendix B

(Alaska State Dept. of Ed., 1991)

GOALS AND OBJECTIVES



MEDIA

1.10 Identify Community Resources
4.6 Present information and ideas through personally designed produced media
2.20 Select and use reference material
2.21 Select and use current periodicals

ART

Music 5.8 Know composition from N. C. musical heritage (songs from labor union or about factory work)
Theater Arts 1.5 Pantomine (tasks in a production process)
Visual Arts 3.1 Drawing and Painting - (mural of Business or Industry)

HEALTHFUL LIVING

1.3 School Safety Education
1.1 Know and apply safe practices related to field trips. Work Safety

COMMUNICATION SKILLS

All - Listening, Speaking, Reading, Writing, Viewing

SCIENCE

1.4 Be aware of current events in Science
3.9 Know the relationship between energy and matter
3.10 Know principle of mechanical energy

SECOND LANGUAGE

1. Listening
2. Speaking
3. Pre-Reading
4. Reading
5. Writing

SOCIAL STUDIES

12.1 Categorize the economic resources of N. C. as natural, human, or capital
12.2 Identify economic resources in N. C.
12.3 Suggest use of economic resources
12.4 Identify relationships among location of labor, supplies, production plants, transportation facilities
13.1 Identify economic resources to produce a particular good or service
13.2 Identify source resources in the production of a good or service

(16.1 and 16.2, 20.1 and 20.2)

MATH

7.1 Determine the frequency of events and tally
1.2 Change numbers to word form (read budgets)

(North Carolina State Dept. of Ed., 1987)